

IN THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of claims:

1. (Currently Amended) A regeneration controller for regenerating an exhaust purification apparatus that is arranged in an exhaust passage for an internal combustion engine, wherein the exhaust purification apparatus includes an upstream purification portion and a downstream purification portion, the regeneration controller comprising:

a difference detector for detecting at least one of a difference in exhaust pressure, between a first location upstream from the exhaust purification apparatus and a second location downstream from the exhaust purification apparatus, and a difference in exhaust temperature, between a third location upstream from the downstream purification portion of the exhaust purification apparatus and a fourth location downstream from the third location;

a calculation section for calculating an estimated accumulation amount of particulate matter in the exhaust purification apparatus, wherein the estimated accumulation amount of ~~particular~~ particulate matter is calculated using at least an exhaust temperature taken at the fourth location and an air intake amount;

a heating control section for heating the exhaust purification apparatus to eliminate the particulate matter from the exhaust purification apparatus when the estimated accumulation amount is greater than a reference accumulation amount; and

a replacement control section for replacing the estimated accumulation amount with a greater estimated accumulation amount when the estimated accumulation amount falls within a replacement determination reference range due to the heating and the at least one difference is greater than a replacement reference value.

2. (Currently Amended) A regeneration controller for regenerating an exhaust purification apparatus that is arranged in an exhaust passage for an internal combustion engine, wherein the exhaust purification apparatus includes an upstream purification mechanism and a downstream purification mechanism that are arranged in the exhaust passage, the regeneration controller comprising:

a difference detector for detecting at least one of a difference in exhaust pressure and a difference in exhaust temperature between an upstream location and a downstream location of the downstream purification mechanism;

a calculation section for calculating an estimated accumulation amount of particulate matter in the exhaust purification apparatus, wherein the estimated accumulation amount of ~~particulate~~ particulate matter is calculated using at least an exhaust temperature taken at the downstream location of the downstream purification mechanism;

a heating control section for heating the exhaust purification apparatus to eliminate the particulate matter from the exhaust purification apparatus when the estimated accumulation amount is greater than a reference accumulation amount; and

a replacement control section for replacing the estimated accumulation amount with a greater estimated accumulation amount when the estimated accumulation amount falls within a replacement determination reference range due to the heating and the at least one difference is greater than a replacement reference value.

3. (Previously Presented) The regeneration controller according to claim 1, wherein the replacement determination reference range includes a value equal to the accumulation amount of particulate matter in the exhaust purification apparatus immediately before the heating is completed.

4. (Previously Presented) The regeneration controller according to claim 1, wherein a maximum value of the replacement determination reference range is equal to the accumulation amount of particulate matter in the exhaust purification apparatus when the heating is completed.

5. (Previously Presented) The regeneration controller according to claim 1, wherein when an estimated accumulation amount obtained by calculation that is resumed, using the replaced estimated accumulation amount, falls within the replacement determination reference range again and the at least one difference is greater than the replacement reference value, the replacement control section repeats the replacement of the estimated accumulation amount.

6. (Original) The regeneration controller according to claim 5, wherein when a state in which the at least one difference is greater than the replacement reference value continues and the number of times the estimated accumulation amount is replaced reaches a stop determination number, the replacement control section refrains from executing the replacement of the estimated accumulation amount until the presently performed heating is completed.

7. (Original) The regeneration controller according to claim 6, further comprising:
a correction control section for correcting the replacement reference value to generate a corrected reference value that is used for subsequent heating when a state in which the difference in exhaust pressure is greater than the replacement reference value continues and the number of times the estimated accumulation amount is replaced reaches the stop determination number.

8. (Original) The regeneration controller according to claim 7, wherein the correction control section increases the replacement reference value based on the value of the difference in the exhaust pressure when the number of times the estimated accumulation amount is replaced reaches the stop determination number.

9. (Previously Presented) The regeneration controller according to claim 2, wherein the regeneration controller is provided with a sulfur elimination mode for restoring the exhaust purification apparatus from sulfur poisoning by releasing sulfur components from the exhaust purification apparatus, and the replacement control section refrains from replacing the estimated accumulation amount when the regeneration controller is in the sulfur elimination mode or when the sulfur elimination mode is requested.

10-19. (Canceled)

20. (Previously Presented) An electronic control unit serving as the calculation section, the heating control section, and the replacement control section according to claim 1.

21-22. (Canceled)

23. (Previously Presented) The regeneration controller according to claim 1, wherein the exhaust purification apparatus is a catalytic converter including a base coated with a layer of NO_x storage reduction catalyst, the base being formed to filter particulate matter contained in exhaust.

24. (Previously Presented) The regeneration controller according to claim 1, wherein the exhaust purification apparatus includes:

- a NO_x storage reduction catalyst device; and
- a filter, arranged downstream from the NO_x storage reduction catalyst device and having a layer of NO_x storage reduction catalyst, for filtering particulate matter contained in exhaust.

25. (Previously Presented) The regeneration controller according to claim 1, wherein the third location is located in the exhaust purification apparatus, and the fourth location is downstream from the exhaust purification apparatus.

26. (Previously Presented) The regeneration controller according to claim 2, wherein the replacement determination reference range includes a value equal to the accumulation amount of particulate matter in the exhaust purification apparatus immediately before the heating is completed.

27. (Previously Presented) The regeneration controller according to claim 2, wherein a maximum value of the replacement determination reference range is equal to the accumulation amount of particulate matter in the exhaust purification apparatus when the heating is completed.

28. (Previously Presented) The regeneration controller according to claim 2, wherein when an estimated accumulation amount obtained by calculation that is resumed, using the replaced estimated accumulation amount, falls within the replacement determination reference range again and the at least one difference is greater than the replacement reference value, the replacement control section repeats the replacement of the estimated accumulation amount.

29. (Previously Presented) The regeneration controller according to claim 28, wherein when a state in which the at least one difference is greater than the replacement reference value continues and the number of times the estimated accumulation amount is replaced reaches a stop determination number, the replacement control section refrains from executing the replacement of the estimated accumulation amount until the presently performed heating is completed.

30. (Previously Presented) The regeneration controller according to claim 29, further comprising:

a correction control section for correcting the replacement reference value to generate a corrected reference value that is used for subsequent heating when a state in which the difference in exhaust pressure is greater than the replacement reference value continues and the number of times the estimated accumulation amount is replaced reaches the stop determination number.

31. (Previously Presented) The regeneration controller according to claim 30, wherein the correction control section increases the replacement reference value based on the value of the difference in the exhaust pressure when the number of times the estimated accumulation amount is replaced reaches the stop determination number.

32. (Previously Presented) The regeneration controller according to claim 2, wherein the regeneration controller is provided with a sulfur elimination mode for restoring the exhaust purification apparatus from sulfur poisoning by releasing sulfur components from the exhaust purification apparatus, and the replacement control section refrains from replacing the estimated accumulation amount when the regeneration controller is in the sulfur elimination mode or when the sulfur elimination mode is requested.

33. (Previously Presented) The regeneration controller according to claim 2, wherein the exhaust purification apparatus is a catalytic converter including a base coated with a layer of NO_x storage reduction catalyst, the base being formed to filter particulate matter contained in exhaust.

34. (Previously Presented) The regeneration controller according to claim 2, wherein the exhaust purification apparatus includes:

- a NO_x storage reduction catalyst device; and
- a filter, arranged downstream from the NO_x storage reduction catalyst device and having a layer of NO_x storage reduction catalyst, for filtering particulate matter contained in exhaust.

35. (Previously Presented) An electronic control unit serving as the calculation section, the heating control section, and the replacement control section according to claim 2.

36-43. (Canceled)